present and the preceding reports, that they contain a mass of information on fish and fisheries of a kind which has never been before brought to a focus, and in issuing such a guide to all interested, the United States Government has set us an example which we ought at once to follow. The volume is published at Washington, and is printed at the Government Printing Office.

LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts, No notice is taken of anonymous communications.

[The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to insure the appearance even of communications containing interesting and novel facts.]

Cyanogen in Small Induction Sparks in Free Air

AMONG the "Notes" in NATURE for July 19 (p. 281), where the products of combustion are given for various illuminants in common or uncommon use, and where coal-gas, oils, and candles have a fearful amount of both water-vapour and carbonic acid charged against them, the return for electric lights both in the arc and incandescent shapes is given as 0·0 for each; a return which is there considered to show "the great supremacy of electric lighting over all the other methods of illumination when considered as a matter of health."

Now this I believe is most happily true of the incandescent electric lights hermetically sealed in their vacuous glass globes; but who, on second thoughts, would presume to say that it is so with the arc lights, consuming their carbons visibly in the open air? The solid carbon gradually disappears from view, every one allows, and if it has not combined in gaseous condition with the oxygen of the atmosphere, like that of wax candles, it must have mainly combined with the nitrogen, and formed the far more deleterious compound gas, cyanogen, the basis of prussic acid: and that such gas or hydrocyanic acid is produced in the electric arc was set forth by Prof. James Dewar in the *Royal Society Proceedings* for June 19, 1879.

Leaving the great arc lights, therefore, to such a master of the subject, chemical, physical, and electrical, as the Jacksonian Professor in the University of Cambridge, I would request to be allowed to mention here a spectroscopic proof, which I have not seen mentioned before, that cyanogen is also formed in every induction electric spark worked under atmospheric pressure.

In plate 1 of M. Lecoq de Boisbaudran's admirable "Spectres Lumineux" he gives beautifully engraved views of the spectrum of the induction electric spark first at the positive pole, then at the negative pole with a "mean length" of spark, which was in his case probably about one inch; its extreme length with his induction coil and bichromate battery, in its best condition, being two inches.

Now the spectrum he gives for the positive pole is neither more nor less than the low temperature spectrum of nitrogen; that is as we see nitrogen in a gas-vacuum tube, with all its numerous and delicately shaded bands as such, though it is bioxide of nitrogen according to M. Thalén.

But the spectrum which M. Lecoq de Boisbaudran gives for the negative pole has in addition to the above, and besides the red hydrogen line, a number of other most distinct lines and bands, including one line in the violet, which he dignifies with the letter α, and which is certainly the grandest thing in the whole spectrum.

In his printed pages I do not find that the celebrated French spectroscopist gives any explanation of the origin of either that line or the other supernumeraries, the hydrogen line excepted. But on turning to my own paper on "Gaseous Spectra" printed in vol. xxx. of the *Transactions of the Royal Society, Edinburgh*, in 1881, I find on pp. 119 and 122, last column, that almost every one of the lines and bands which I had separated there from the impurities or dissociated elements of the tube's contents and had put down as due to the compound gas "cyanogen" is coincident in place and character with some one or other supernumerary in M. Lecoq de Boisbaudran's spectrum of the negative pole. My spectrum places are indeed very rough, owing to the small amount of dispersion then employed, viz. one simple prism of white flint with a refracting angle of 52°; but the testimony of the whole is cumulative, and, considering

Spark at the Negative Pole in the Open Air by M. Lecoq de Boisbaudran, with a rather Wide Slit

Colour Region.	W. N. Place approx. in Brit. inch.	Intensity approx.	Appearance approx.	Description.
Orange	41,300	2		Narrow band.
Citron	44,850	3		Stronger band with hazy line.
Green	48,600 / 49,300	4		Group of bands and hazy lines.
Green	50,100 / 50,800	3		Broad band with stronger edges.
Glaucous	53,800 / 54,700	4		Larger and stronger than the preceding.
Blue	55,200	2		Very thin line.
Violet	**59,400**	**8**		**Most powerful line, the α of the spectrum.**
Violet	59,500	5		A darkening of the nitrogen band.
Violet	59,900 / 60,400	5 / 5		Broad band, with strong terminal bars.

Cyanogen's Concluded Spectral Lines by C. Piazzi Smyth, with a rather Narrow Slit

Colour Region.	W. N. Place approx. in Brit. inch.	Intensity.	Appearance.	Description.	Reference page.
Orange	41,146 / 41,552	2 / 2		Cyanogen? / Cyanogen	121
Citron	44,878	2		True cyan. group	120 & 121
Green	48,582	4		Sharp line begins a band of lines.	120
	49,350	3		Isolated line.	120 & 122
Green	49,996 / 50,728	2 / 3		Cyanogen. / Do.	120 and 122
Glaucous.	53,963 / 54,570	3 / 2		Not nitrogen nor carbon. / Cyanogen?	122
Blue	55,271	2		Cyanogen?	120
Violet	**59,405**	**5**		Grand line, followed by a band, characteristic of cyanogen.	120 & 122
Violet	59,985 / 60,356	2·0 / 0·2		Cyanogen. / Cyanogen?	120 & 122
Violet	60,541	1·0		Nitrogen?	120 & 122

the totally independent manner in which my results were arrived at, and the certainty with which they were stated on their own merits, perfectly overwhelming.

Thus—of the line which I now identify with that one which is

facile princeps in M. Lecoq de Boisbaudran's spectrum of the negative pole, and was therefore termed α by him, though to the confounding of his series of Greek letters in the positive pole's spectrum—I wrote of it in 1880 as "grand line peculiar to cyanogen," "the powerful violet line (viz. the above) at 59,405 W.N.B. inch, may become useful as a reference for place to many observers," and "grandly strong violet line, followed by a band; specially characteristic of cyanogen."

But a better view of the testimony of the whole case will be found in the above pair of tables, in the first of which I have collected, in a rude way of my own, all the lines and bands which are supernumerary in M. Lecoq de Boisbaudran's negative, as compared with his positive, pole; and in the second I have entered my former conclusions from gas-vacuum tube observations of what spectral lines and bands are peculiar to the compound gas cyanogen.

C. PIAZZI SMYTH

15, Royal Terrace, Edinburgh, July 25

The Earliest Known Plotting Scale

THE Babylonian statues recently acquired for the Louvre by the mission of M. de Sarzec are of great interest in the history of measurement. The earliest datable measuring rods hitherto known are two Egyptian masons' cubits of wood, of the reign of Hor-em-heb in the fifteenth century B.C.; but on these statues we find represented not merely a mason's rod, but a finely-divided plotting scale, and the date of these figures is placed before the fifteenth century B.C. Of course the accurate lengths of cubits can easily be recovered from the dimensions of buildings of the earliest periods; but no measures, or accurate representations of such, are preserved to us from the primitive times.

There are several of these diorite statues of King Goudea in the Louvre, some rather less and some rather more than life size; all finely executed in a style superior to anything of the later times from Mesopotamia, with which we were already familiar. They are wrought by means of tubular drills and graving tools, by which lengthy and delicate inscriptions are cut all over the surfaces; the tools employed seem to have been very similar to those used by the early Egyptians for their statuary in diorite, which I recently described at the Anthropological Institute.

The statues which now concern us are two seated figures of an architect (or perhaps the king, as founder); these each bear on the knees a drawing board, 6·3 × 11·3 and 7·4 × 12·7 inches respectively. One board is plain, the other has an elaborate outline of a fortified town, showing all the buttresses and turns of the wall. By the right hand of each figure lies a drawing stylus, and along the front of each board a plotting scale, subdivided along both outer and inner face.

These scales have a sloping face along each side, like modern scales, but meeting in a ridge at the top, like French plotting scales, without a level space. The breadth is ·90, and height ·33 inch, sloping therefore about 36°; the length is just over $10\frac{1}{2}$ inches, or half a cubit, the terminals being lines, with a small surplus beyond them.

The subdivisions vary on the different sides; but the general arrangement is a uniform series of spaces, which we will call digits; these are each $\frac{1}{16}$ of the half cubit, or ·653 inch. Then along one side of each rod the *alternate* digits are subdivided; thus there can be no confusion between digit lines and subdivisions. The dividing lines run the whole width of the face; they are about $\frac{1}{80}$ inch wide, and scored out nearly as deep into the diorite. The subdivisions are of halves, thirds, fourths, fifths, and sixths of a digit; and two sixths are carried over to the other side of the scale, and there further divided into twelfths and eighteenths of a digit; this last fraction being only $\frac{1}{28}$ of an inch.

By calculating a normal scale from the various digit lines (as described in "Inductive Metrology," p. 31) the average error of division may then be computed. It is about the same for the digits and also the subdivisions, varying on different sides from ·009 to ·013 inch; the mean error of all the digit marks is ·011 inch, or about half the breadth of a cut. But it is not to be expected that mere decorative representations like these would be divided with the same care as actual working scales. The mean value of the cubit deduced from these scales is 20·89 ± ·07 inch, which is apparently a long variant of the old 20·63 cubit, and not the later Assyrian cubit of 21·4 or 21·6.

The actual values of the divisions of the two sides of each scale are as follows, stating the amounts as differences from the normal scale in thousandths of an inch, which enables the variations to be most plainly seen. The points measured were about one-third from the bottom edge toward the top ridge.

Normal scale.		Without the plan.				With the plan.			
Digits.	Subdivisions	Outer.		Inner.		Outer.		Inner.	
		+	−	+	−	+	−	+	−
0		(. . .)		12		(. . .)		(. . .)	
·653			15		2	(. . .)		(. . .)	
1·306		(. . .)			20	(. . .)		(. . .)	
1·959		(. . .)			8	(. . .)		(. . .)	
2·612		(. . .)			26	(. . .)		(. . .)	
	$\frac{1}{2}$ 2·938	28		. . .		(. . .)		(. . .)	
3·265			9	2		12		11	
3·917			3	2		. . .		25	
	$\frac{1}{2}$ 4·244	. . .			9	. . .		18	
4·570		(. . .)		. . .		. . .		7	
5·223		(. . .)			8	. . .			11?
	$\frac{1}{3}$ 5·441	. . .		2		. . .		(. . .)	
	$\frac{1}{3}$ 5·658	. . .		4		. . .			1
5·876		(. . .)		4		. . .			1
6·529		(. . .)			5	. . .		8	
	$\frac{1}{4}$ 6·692	. . .		21		. . .		6	
	$\frac{1}{4}$ 6·855	. . .		25		. . .		3	
	$\frac{1}{4}$ 7·018	. . .		18		. . .			1
7·182		7		58			8		10
7·835		1		4		. . .		(. . .)	
	$\frac{1}{5}$ 7·966	. . .		3		. . .		8 ?	
	$\frac{1}{5}$ 8·096	. . .		2		. . .			7
	$\frac{1}{5}$ 8·227	. . .			3	. . .			13
	$\frac{1}{5}$ 8·357	. . .			5	. . .			22
8·488		11		0		. . .			7
	$\frac{1}{2}$ 8·814	. . .		. . .			25	. . .	
9·141			7		12		6		2
	$\frac{1}{6}$ 9·249	. . .			7	. . .			4
	$\frac{1}{6}$ 9·358	. . .			27	. . .			4
	$\frac{1}{6}$ 9·467		14		11	. . .			8
	$\frac{1}{18}$ 9·503		13	. . .		. . .		. . .	
	$\frac{1}{18}$ 9·539		11	. . .		. . .		. . .	
	$\frac{1}{18}$ 9·576		6	0		. . .			19
	$\frac{1}{6}$ 9·685	4		20		. . .			12
	$\frac{1}{12}$ 9·739	14		. . .		. . .		. . .	
9·793		19		20		(. . .)			21
10·446			5		24	(. . .)		(. . .)	

The plain dots show that there was no mark; the dots in brackets where a mark is defaced, or the whole surface destroyed. The great error of ·058 inch is due to a cut run askew, the line being as accurate as the others on the outer face of the rod.

I am indebted to M. Ledrain for kindly granting me permission to take the measurements from these statues.

Bromley, Kent W. M. FLINDERS PETRIE

A Result of our Testimonial System

A LITTLE incident has come under my notice of such a character that I think it ought to be made known to the readers of NATURE.

A candidate, whom I will call Mr. A. B., for a vacant scientific chair in this country writes to an eminent German professor for a "testimonial," and in his letter there occurs the following remarkable sentence:—

". . . 17 *July*, '83

"DEAR SIR,—I intend applying for the vacant chair of . . . at . . ., and would feel grateful if you could send me a testimonial saying a few favourable things of my contributions to the science of . . .

". . . I hope that you will not think me too bold in asking this request, and as I know your time is too valuable to be trespassed on by a stranger, *I beg that you will accept the inclosed.*"

The German professor, whom I will call Prof. C., thereupon writes to a distinguished English professor, who is a personal friend of his, the following letter, which has been placed in my hands with the request that I will add a few comments. The letter, which I give in its original language in order that none of its force may be lost, runs as follows:—